Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
Mississippi River—Cont'd	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Dubuque, Iowa†	1,679	15	... .	....	.....	.....	.....	.....
Leclaire, Iowa†	1,589	10	.....	.....	.....	....	.....	.....
Davenport, Iowa†	1,573	15	.....	.....	.....	.....	.....	.....
Keokuk, Iowa [a]	1,443	14	8.0	4	3.9	27	5.8	4.1
Hannibal, Mo	1,332	17	5.7	23	3.1	1	4.3	2.6
Grafton, Ill	1,284	23	8.8	25, 26	4.8	1	7.3	4.0
St. Louis, Mo.	1,241	30	15.4	25	4.8	2	10.8	10.6
Chester, Ill.	1,170	30	11.6	25	2.9	3	7.5	8.7
Cairo, Ill	1,078	40	40.0	28	14.0	4	28.0	26.0
Memphis, Tenn	843	33	26.4	28	8.0	7	18.3	18.4
Helena, Ark	767	37	33.8	28	14.2	7	25.3	19.6
Arkansas City, Ark.	635	42	35.1	23, 24	19.1	9	28.0	16.0
Greenville, Miss	595	40	30.0	23, 24	15.9	9, 10	23.5	14.1
Vicksburg, Miss	474	41	33.3	25, 26	18.0	12	25.9	15.3
New Orleans, La	108	16	11.2	27, 28	7.5	14, 15	9.2	3.7
Arkansas River.								
Fort Smith, Ark.	345	22	10.1	10	3.5	1–3, 6	6.6	6.6
Dardanelle, Ark.	250	21	8.8	26	3.3	5	5.8	5.5
Little Rock, Ark.	170	23	10.2	13	5.5	6	7.6	4.7
White River.								
Newport, Ark	150	21	13.9	12	6.1	4	9.4	7.8
Illinois River.								
Peoria, Ill.	135	14	13.8	26	10.6	17	11.8	3.2
Missouri River.								
Bismarck, N. Dak.†	1,201	14	.....	.....	.....	.....	.....	.....
Pierre, S. Dak.†	1,006	14	.....	.....	.....	.....	.....	.....
Sioux City, Iowa†	676	19	.....	.....	.....	.....	.....	.....
Omaha, Nebr.	561	18	9.7	1	8.3	18	9.0	1.4
Kansas City, Mo.	280	21	11.3	6	8.8	20	10.3	2.5
Boonville, Mo.	191	20	9.8	24	3.6	1	7.3	6.2
Hermann, Mo. [f]	95	21	8.5	23–25	5.7	12	7.1	2.8
Ohio River.								
Pittsburg, Pa	966	22	28.9	24	2.6	2	9.6	26.3
Davis Island Dam, Pa.	960	25	26.6	24	4.4	2, 3	13.3	22.2
Wheeling, W. Va. [b]	875	36	38.7	24	9.5	2	16.1	29.2
Marietta, Ohio [c]	795	25	26.0	25	10.1	6	20.7	25.9
Parkersburg, W. Va. [d]	785	38	37.9	25	8.3	5	20.3	29.6
Point Pleasant, W. Va.	708	36	52.3	25	3.5	1	26.8	48.8
Catlettsburg, Ky	651	50	58.5	25	6.2	1	32.6	52.3
Portsmouth, Ohio	612	50	59.0	25	5.7	1	33.7	53.3
Cincinnati, Ohio	499	45	61.1	26	10.1	2	36.3	51.0
Louisville, Ky. [d]	367	24	35.4	28	5.8	3	16.7	29.6
Evansville, Ind	184	30	42.6	28	9.0	2	27.1	33.6
Mount Vernon, Ind. [e]	148	35	41.9	28	10.5	6	29.4	31.4
Paducah, Ky.	47	40	36.4	28	9.7	3	23.6	26.7
Alleghany River.								
Warren, Pa	177	7	3.0	8	0.8	1–6	1.7	2.2
Oil City, Pa	123	13	7.4	8	1.8	1–3	3.1	5.6
Parker, Pa.	73	20	10.2	9	1.8	3–5	3.7	8.4
Freeport, Pa.	26	20	17.2	23	5.2	1	7.7	12.0
Conemaugh River.								
Johnstown, Pa. [a]	64	7	10.5	23	1.6	6	3.3	8.9
Red Bank Creek.								
Brookville, Pa.	35	8	4.1	24	1.0	1–6	1.7	3.1
Beaver River.								
Ellwood Junction, Pa.	10	14	15.3	9	1.8	1–6	4.8	13.5
Big Sandy River.								
Louisa, Ky.	26	20	46.6	23	5.3	1	17.7	41.3
Cumberland River.								
Burnside, Ky	434	50	51.5	22	3.2	1	16.0	48.3
Carthage, Tenn.	257	30	37.7	26	3.4	1	17.2	34.3
Nashville, Tenn	175	40	37.5	28	6.2	1	20.2	31.3
Great Kanawha River.								
Charleston, W. Va.	61	30	41.5	23	3.0	1	13.2	38.5
New River.								
Radford, Va.	153	14	11.5	22	0.3	1, 2	3.2	11.2
Hinton, W. Va.	93	14	12.9	24	1.1	1	5.7	11.8
Licking River.								
Falmouth, Ky. [d]	30	25	27.8	23	4.0	19, 20	10.4	23.8
Miami River.								
Dayton, Ohio	69	18	5.9	22	1.4	4	3.4	4.5
Monongahela River.								
Weston, W. Va. [b]	161	18	15.2	23	0.0	28	2.7	15.2
Fairmont, W. Va.	119	25	27.8	23	1.8	1, 2	6.4	26.0
Morgantown, W. Va. [a]	95	20	29.5	23	8.5	20	12.7	21.0
Greensboro, Pa.	81	18	33.5	23	7.5	1–4	12.6	26.0
Lock No. 4, Pa.	40	28	36.0	23, 24	6.7	1, 2	14.3	29.3
Cheat River.								
Rowlesburg, W. Va. [f]	36	14	13.5	23	3.0	{10, 11. 15} {16, 19, 20}	5.3	10.5
Youghiogheny River.								
Confluence, Pa.	59	10	13.6	22	1.4	5	4.5	12.2
West Newton, Pa. [f]	15	23	23.0	23	2.1	11	6.0	19.9

Heights of rivers above zeros of gauges—Continued.

Stations.	Distance to mouth of river.	Danger-line on gauge.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
Tennessee River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Knoxville, Tenn.	614	29	26.0	24	1.8	1	7.0	24.2
Chattanooga, Tenn.	430	33	35.0	26	3.0	1	13.3	32.0
Bridgeport, Ala	390	24	24.3	27	1.5	1	10.0	22.8
Florence, Ala.	220	16	16.0	28	2.9	1	8.4	13.1
Johnsonville, Tenn.	94	21	20.1	28	5.5	2	12.5	14.6
Rockwood, Tenn	519	20	27.5	25	3.0	1	9.5	24.5
Wabash River.								
Terre Haute, Ind. [g]	165	16	16.1	23	7.0	14	12.9	9.1
Mt. Carmel, Ill. [a]	50	15	19.2	28	5.0	4–6	11.1	14.2
Red River								
Arthur City, Tex.	668	27	4.2	6	3.1	28	3.4	1.1
Fulton, Ark	565	28	5.2	11	2.7	28	3.8	2.5
Shreveport, La.	449	29	5.6	1	0.5	28	2.9	5.1
Alexandria, La	139	33	15.6	8	4.1	28	9.4	11.5
Atchafalaya River.								
Melville, La.	100*	31	27.6	28	22.3	15	25.1	5.3
Ouachita River.								
Camden, Ark.	340	39	13.5	12	7.0	28	9.6	6.5
Monroe, La	100	40	26.1	9	19.4	28	24.2	6.7
Yazoo River.								
Yazoo City, Miss.	80	25	14.0	27–28	8.3	3, 4	11.1	5.7
Tombigbee River.								
Columbus, Miss.	285	33	6.5	9	—0.2	23	3.0	6.7
Demopolis, Ala.	155	35	28.6	13	5.4	1	16.6	23.2
Black Warrior River.								
Cordova, Ala	155	20	9.0	12	4.4	20–22	6.2	4.6
Tuscaloosa, Ala.	90	38	25.9	13	3.9	1	15.1	22.0
Alabama River.								
Montgomery, Ala.	265	35	24.2	15	3.5	1	11.9	20.7
Selma, Ala.	212	35	27.5	15	2.6	1, 2	14.2	24.9
Coosa River.								
Rome, Ga	225	30	11.7	24	2.8	1	5.9	8.9
Wilsonville, Ala	66	15	7.6	26	3.0	1, 2	5.7	4.6
Tallapoosa River.								
Sturdevant, Ala.	69	15	3.0	9	1.0	15, 20, 22	1.8	2.0
Savannah River.								
Augusta, Ga	130	32	27.1	7	7.2	1	15.5	19.9
Edisto River.								
Edisto, S. C	75	6	5.9	14, 15	3.7	5	5.1	2.2
Congaree River.								
Columbia, S. C.	37	15	20.7	7	1.9	1	5.8	18.8
Santee River.								
St. Stephens, S. C.	50	12	13.7	15	7.3	5	9.5	6.4
Wateree River.								
Camden, S. C	45	24	29.7	8	5.2	1	15.1	24.5
Black River.								
Kingstree, S. C.	60	12	10.3	15	6.2	5	8.9	4.1
Great Pee Dee River.								
Cheraw, S. C.	145	27	31.4	8	2.7	1	15.1	28.7
Linch Creek.								
Effingham, S. C	35	12	14.0	14	5.8	1	10.3	8.2
Lumber River.								
Fairbluff, N. C.	10	6	6.5	28	2.8	1	5.0	3.7
Waccamaw River.								
Conway, S. C	40	7	7.0	28	3.2	1	5.2	3.8
Cape Fear River.								
Fayetteville, N. C.	100	38	36.5	8	5.5	1	19.2	31.0
James River.								
Lynchburg, Va. [b]	257	18	13.6	24	0.8	2	4.9	12.8
Richmond, Va.	110	10	15.0	24	—0.1	1	4.4	15.1
Potomac River.								
Harpers Ferry, W. Va.	170	16	24.5	24	1.4	1	7.6	23.1
Susquehanna River.								
Wilkesbarre, Pa. [b]	178	14	3.0	24, 25	1.0	20–22	.....	2.0
Harrisburg, Pa.	70	17	7.9	24	3.0	6	4.6	4.9
W. Br. of Susquehanna.								
Lock Haven, Pa.	68	10	6.5	23	0.5	1–6	1.5	6.0
Williamsport, Pa.	35	20	8.8	24	1.5	2–6	3.6	7.3
Juniata River.								
Huntingdon, Pa.	80	24	8.7	23	3.2	6	4.5	5.5
Sacramento River.								
Redbluff, Cal.	241	23	21.6	6	5.6	27	10.4	16.0
Sacramento, Cal.	70	28	24.2	9, 10	20.5	28	21.6	3.7
Willamette River.								
Eugene, Oreg	149	10	13.0	16	3.2	27	6.3	8.8
Albany, Oreg	99	20	18.4	17	5.0	26, 27	10.4	13.4
Salem, Oreg.	69	20	17.6	17	5.6	27, 28	11.0	12.0
Portland, Oreg.	10	15	13.5	17	3.5	27	8.7	10.0

*Distance to the Gulf of Mexico. †Frozen. [a] Frozen 1–3. [b] Frozen 1. [c] Frozen 1–5. [d] Frozen 1–2. [e] Frozen 1–6. [f] Frozen 1–7. [g] Frozen 1–13. [h] Frozen 1–19.

SPECIAL CONTRIBUTIONS.

WIND NOMENCLATURE.

By FRANK W. PROCTOR (dated April 2, 1897).

There is such variance of verbal usage among meteorologists in stating the direction of horizontal air movements, except when they are spoken of as winds, that it is frequently impossible to understand from the words used what the direction is.

The following quotations will serve as illustrations:

"Easterly current" [from the west].—FERREL.

"Westerly current" [from the west].—CLAYTON.

"Northeast current" [return polar current].—DAVIS.

"Southwesterly currents" [from southwest].—CLEMENT LEY.

"Easterly current" [from the east].—ABERCROMBY.

"West current" [from the west].—ABBE.

In speaking of *currents* of air all of the authors cited, save

one, indicate the direction of motion by referring to the source. Ferrel alone names his current with reference to its destination.

With singular inconsistency *motions* and *movements* are frequently denoted by adjectives showing whither the air goes, as will be seen by the following:

"Westerly motion" [toward the west].—FERREL.
"Easterly wind movements" [toward the east].—CLAYTON.
"Southeasterly movement of low" [toward southeast].—ABBE.
"Westerly motion" [toward the west].—WALDO.
"Westerly moving air" [toward the west].—BIGELOW.

But this usage is not uniform, for the opposite is seen in—

"Northeast motion" [from northeast].—ABERCROMBY.
"Southwest movement of upper air" [from southwest].—ABBE.

Components and *direction* give further differences:

"West component" [westward].—FERREL.
"The westerly component" [eastward].—CLAYTON.
"Westerly component" [westward].—BIGELOW.
"Southerly component" [northward].—CLAYTON.
"Wind deflected into a northeasterly direction" [toward northeast].—FERREL.
"The deflection from the general westerly direction" [eastward].—CLAYTON.

Drift furnishes further anomalies:

"Northerly drift" [from the north.]—CLAYTON.
"Direction of drift" [toward which it moves].—CLAYTON.
"Direction of currents" [from which they come].—CLAYTON.

Occasionally a *wind* is named from the direction toward which it blows.

"Easterly winds" [from the west].—WALDO.
"Westerly winds of the tropics."—A. J. HENRY.

Other peculiarities of wind nomenclature may be found.

"The return polar underflow [would cause] west-northwest winds until entering the latitudes of the trades their *course turned around to northeast*" [italics supplied].—DAVIS.

"Numerous studies of cyclonic circulation have shown that the higher currents blow more *to the right* [italics supplied] than the surface winds."—DAVIS.

"All across the temperate zone * * * we find the prevailing westerly winds; the surface members *blowing west-southwest*" [italics supplied].—DAVIS.

"Tropical trades blowing westerly."—BIGELOW.

"The trades which blow in a somewhat westerly direction."—LEY.

The foregoing examples are selected at random, not as being typical nor in criticism of any of the books from which they are taken, but simply as convenient illustrations, and for the purpose of calling attention to the fact that there is no uniform usage in naming wind currents, and to the desirability of having them described in such terms that no ambiguity can arise.

Currents of water commonly have their direction described by the points toward which they flow, and it would seem to be the better way to follow this usage with air currents when using, with reference thereto, the words *current*, *movement*, *motion*, *direction*, *drift*, etc., giving to the word *wind* alone a name referring to the source of motion.

NOTES BY THE EDITOR.

SUGGESTIONS TO OBSERVERS.

The Weather Bureau requires from its regular observers, as obligatory, a great variety of meteorological data, such as is liable to be called for at any moment by the business men and the citizens of the country, or by any scientist. The voluntary observers may be classified according to the object, the character and completeness of their reports. The greater number belong to that class whose main work consists in keeping a faithful record of the maximum and minimum temperatures, the total precipitation, and, possibly, the snowfall, the frosts, the hail, the wind, and all other matters that specially affect agricultural interests. Then comes the small class of those who keep a more complete record (sometimes even with self-registering instruments), adapted to determine all the important climatological elements of a given locality. Besides these there are other persons who interest themselves almost entirely in one narrow line of study, such as tornadoes, thunderstorms, auroras, wind velocity, the amount and rate of rainfall, the distribution of frost, the formation of frostwork, the photography and the altitudes and movements of clouds. These, and other subjects too numerous to mention, have each their special devotees, and those who are busied in such special work may be known as "special observers" independently of any activity as regular or voluntary observers. The pamphlets of instructions and the forms for the daily use of the regular and the voluntary observers, are, of course, necessarily reduced to the smallest possible bulk, and those who desire instructions, or rather suggestions, relative to special classes of observations must be provided for by special instructions and forms.

The attention of the reader, and especially of the section directors, is respectfully called to the current Table IX, formerly Table X, showing the frequency of thunderstorms and auroras for the month. In this table is given the number of stations (both regular and voluntary and special) that reported thunderstorms or auroras on any given day between midnight and midnight, of local standard meridian time. If, for instance, Arkansas having 51 stations sends 16 reports of thunderstorms on January 2, then we would naturally infer that thunderstorms occurred at about one-third of the stations, or over one-third of the State on that day. But this inference is liable to serious error for several reasons: (1) Some of the stations may have made no attempt to keep records of thunderstorms; (2) some stations may have recorded only those storms that passed over the station with rain, while others may have recorded any storm that passed within a mile, or within five miles, or even within sight of the station. In making up the annual summaries of thunderstorms and auroras for 1895 and 1896, the number of stations published from month to month, as reporting meteorological data in general, was replaced by the estimated number of those which probably sent a fairly complete record of thunderstorms and auroras. It is now desired to revise these numbers with greater exactness, and the Editor, with the permission of the Chief of Bureau, would earnestly request each voluntary observer to inscribe upon each monthly report some indications as to his rules for observing and recording both thunderstorms and auroras. The information particularly desired just now is the following:

Do you make a special and regular effort to complete your record, so that it shall show every thunderstorm and every aurora, or does it give only some of those that happened in your vicinity?

To those observers who aim to make a specially complete